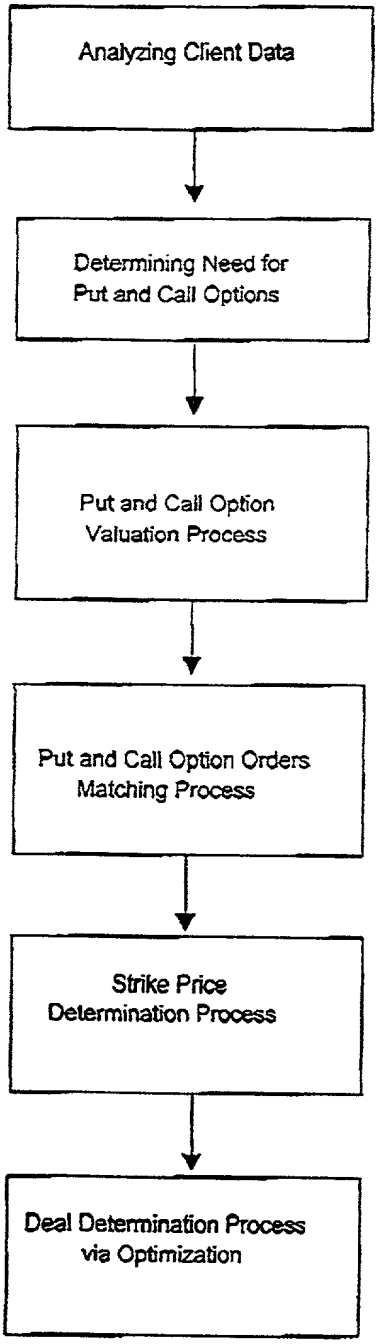


Fig 1
Top Level Overview
of General Process

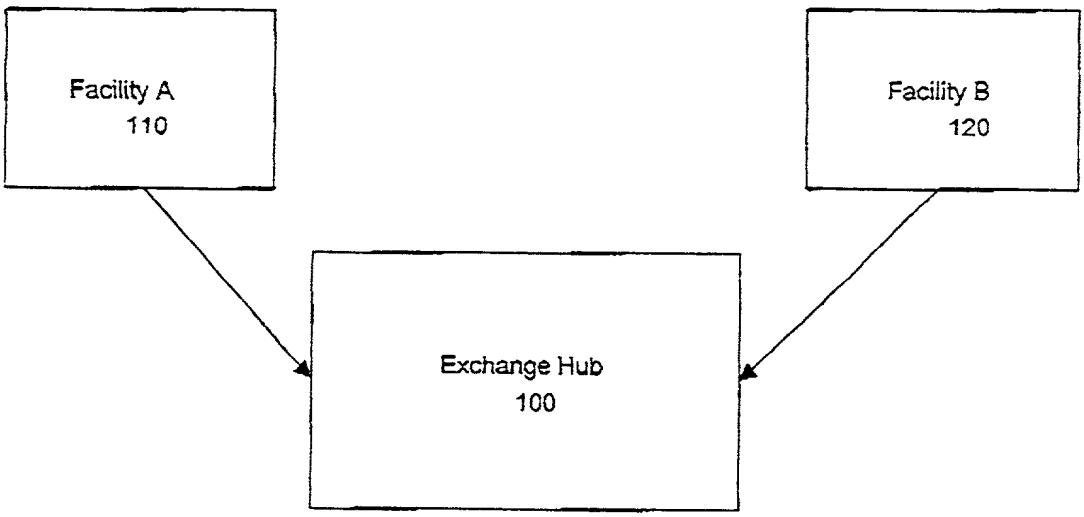
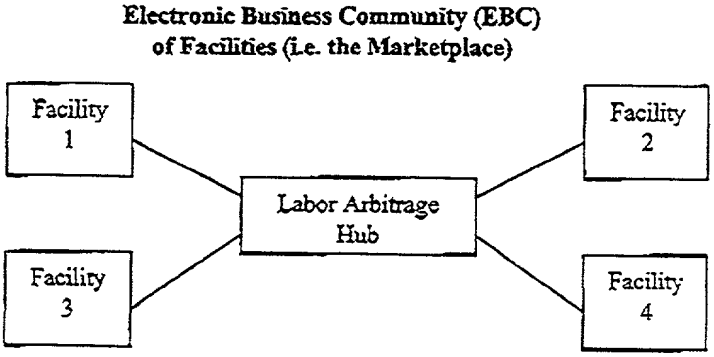


Fig. 2

EBC Example

Figure 3: **Labor Arbitrage Electronic Business Community.** *An Intelligent Marketplace.*



NOTE: Multiple, separate, or overlapping EBC's exist at intellicost.com For example, in healthcare, EBC must be in same geographic region

Figure 4: **Labor Arbitrage Electronic Business Community.**

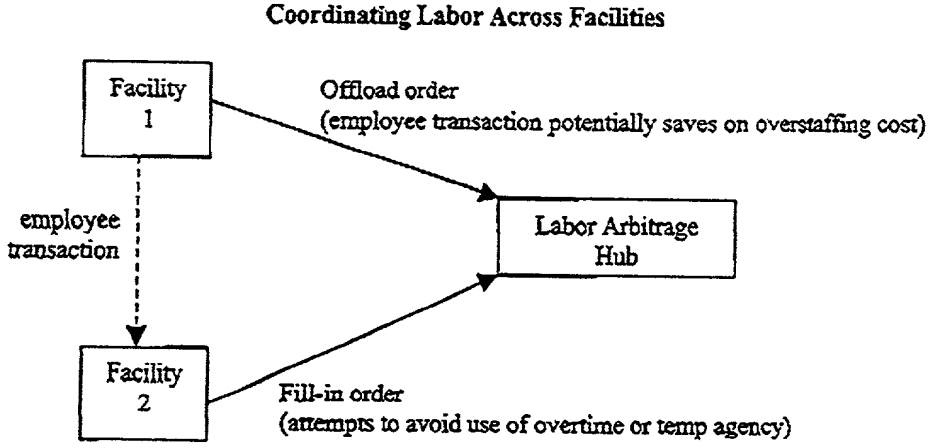
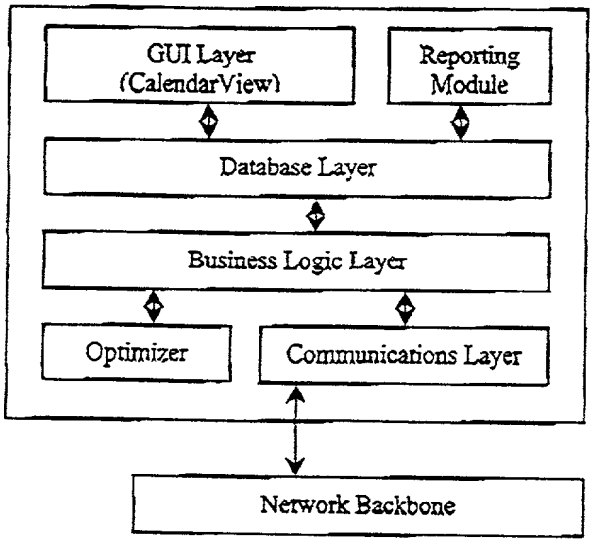


Figure 5: **Client Process Layers**



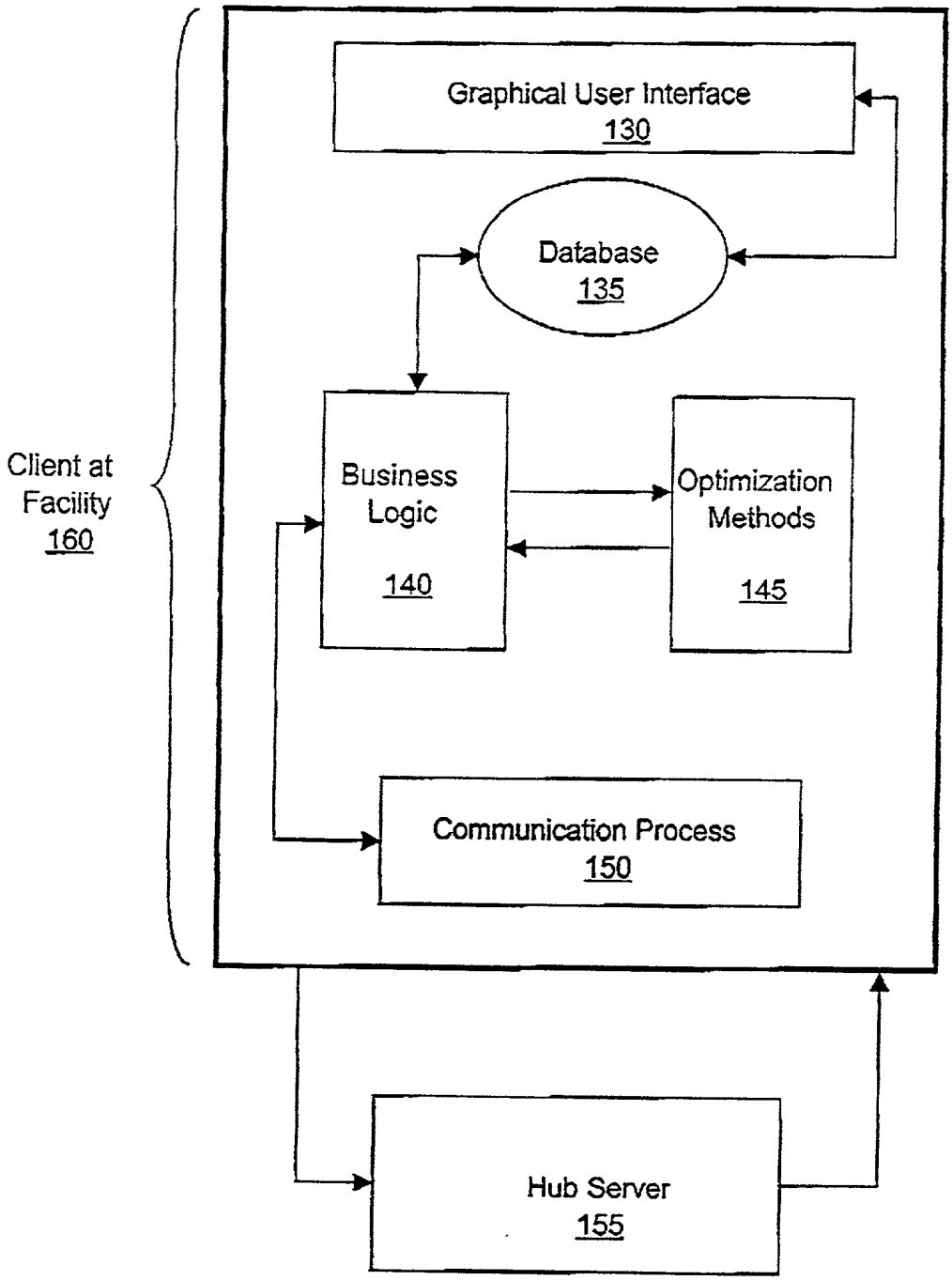


Fig. 6
Client Process at Facility

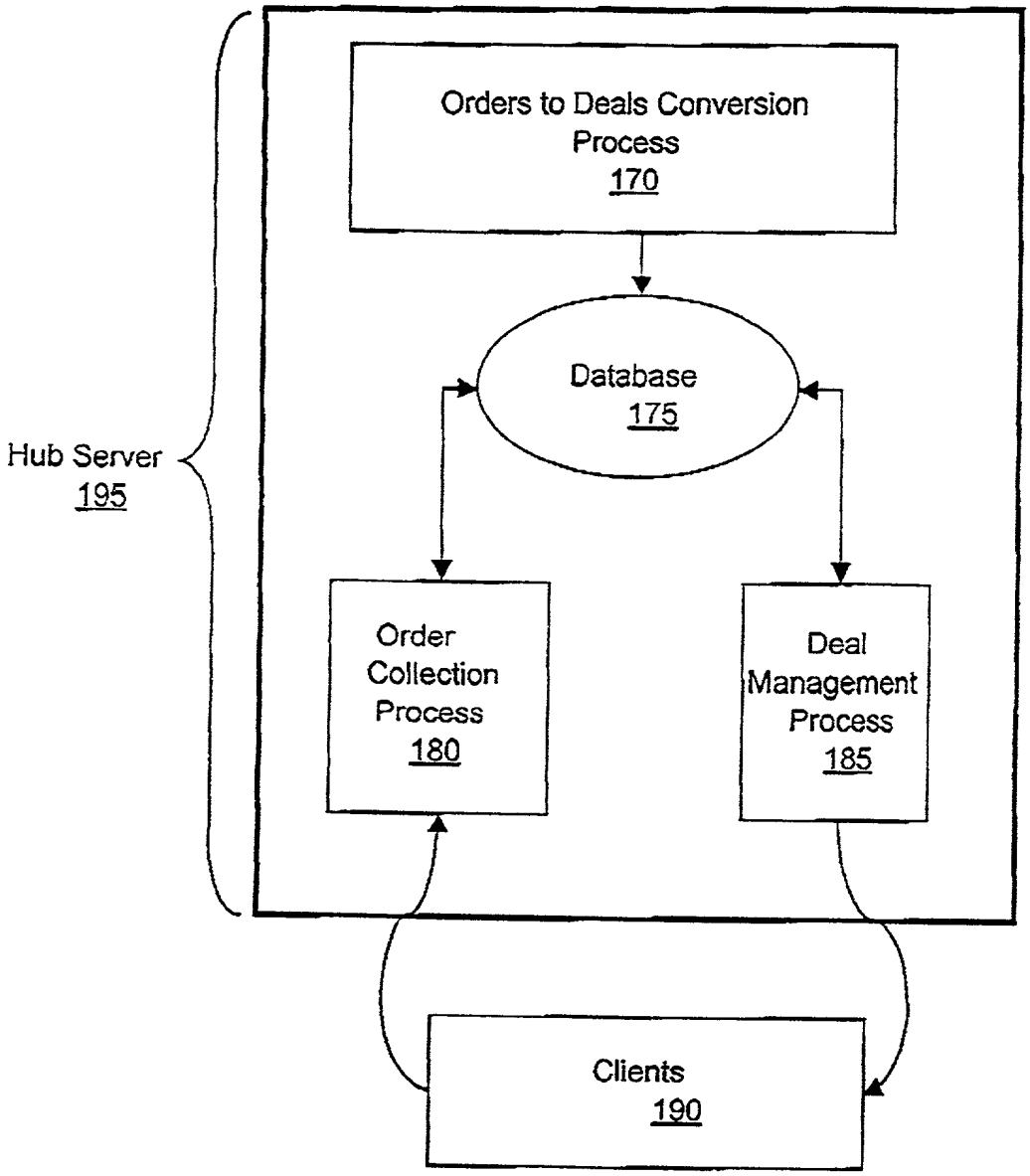


Fig. 7
Server Process at Hub

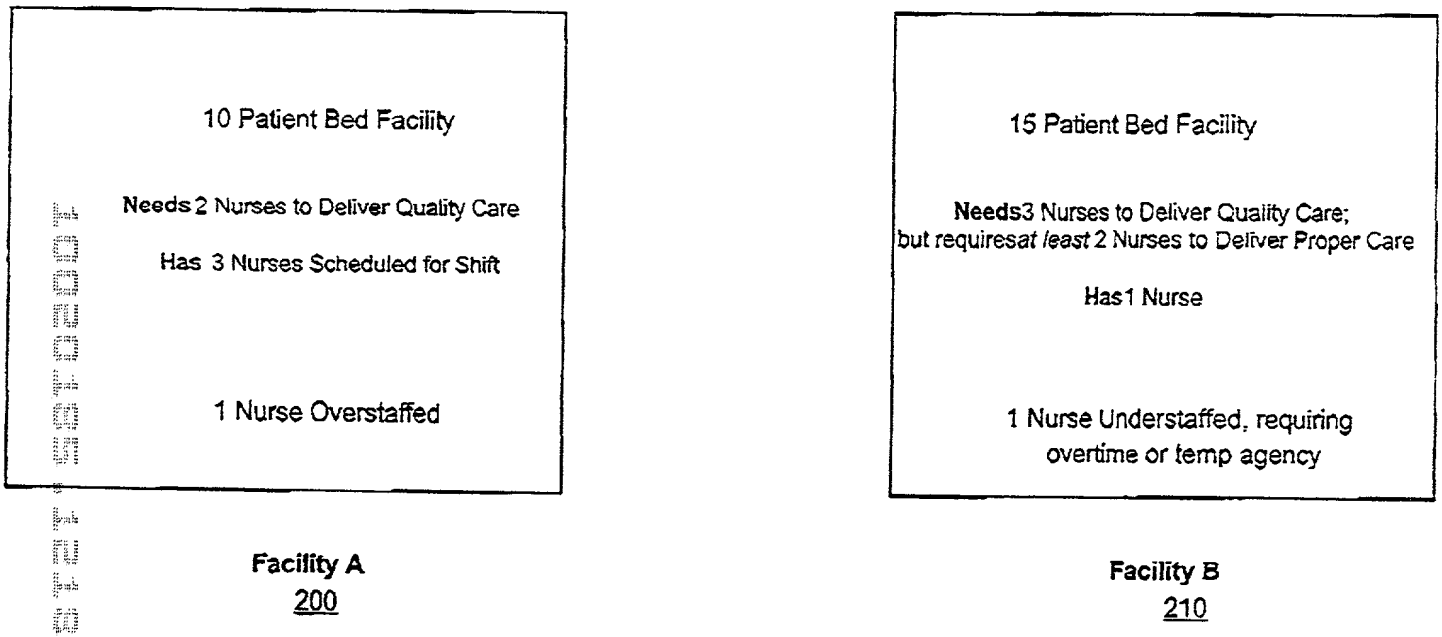


Fig. 8
Staffing Situation at
Example Facilities

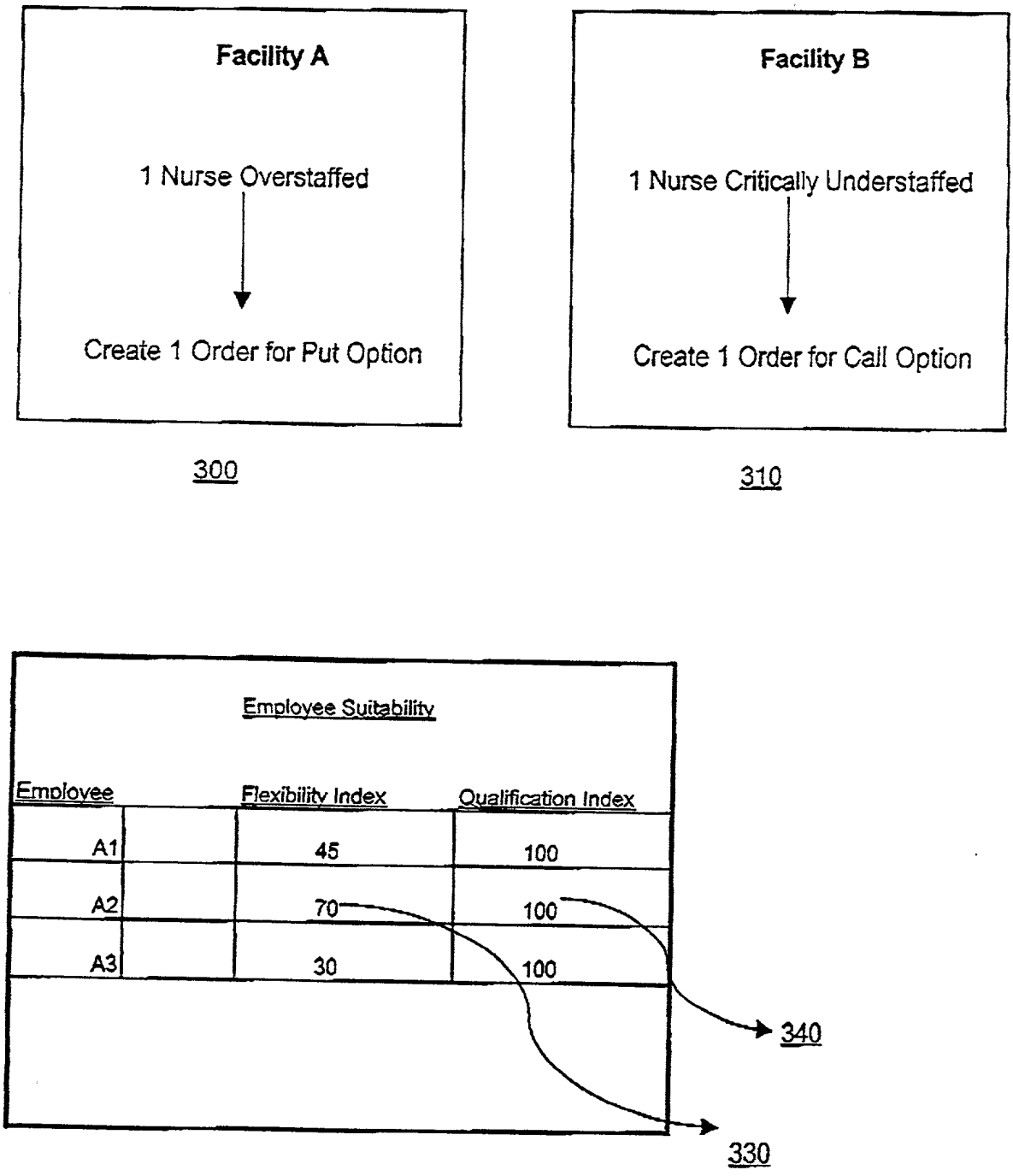


Fig. 9
Determining Need for,
and Creating, Option
Orders

Figure 10: Options Order Valuation

Facility A

1 overstaffed shift excess cost simple illustration

8 hours * $20/hour = $160
Put option value = $160

Facility B

1 understaffed to critical shift excess cost, simple illustration

(8 hours * $20/hr = $160 for regular, in house employee)

However, 8 hours * $40/hr = $320 for typical agency employee

Figure 11: Internal Transaction Valuation and Selection
(employing change management to minimize disruption, which is critical to exchange valuation)

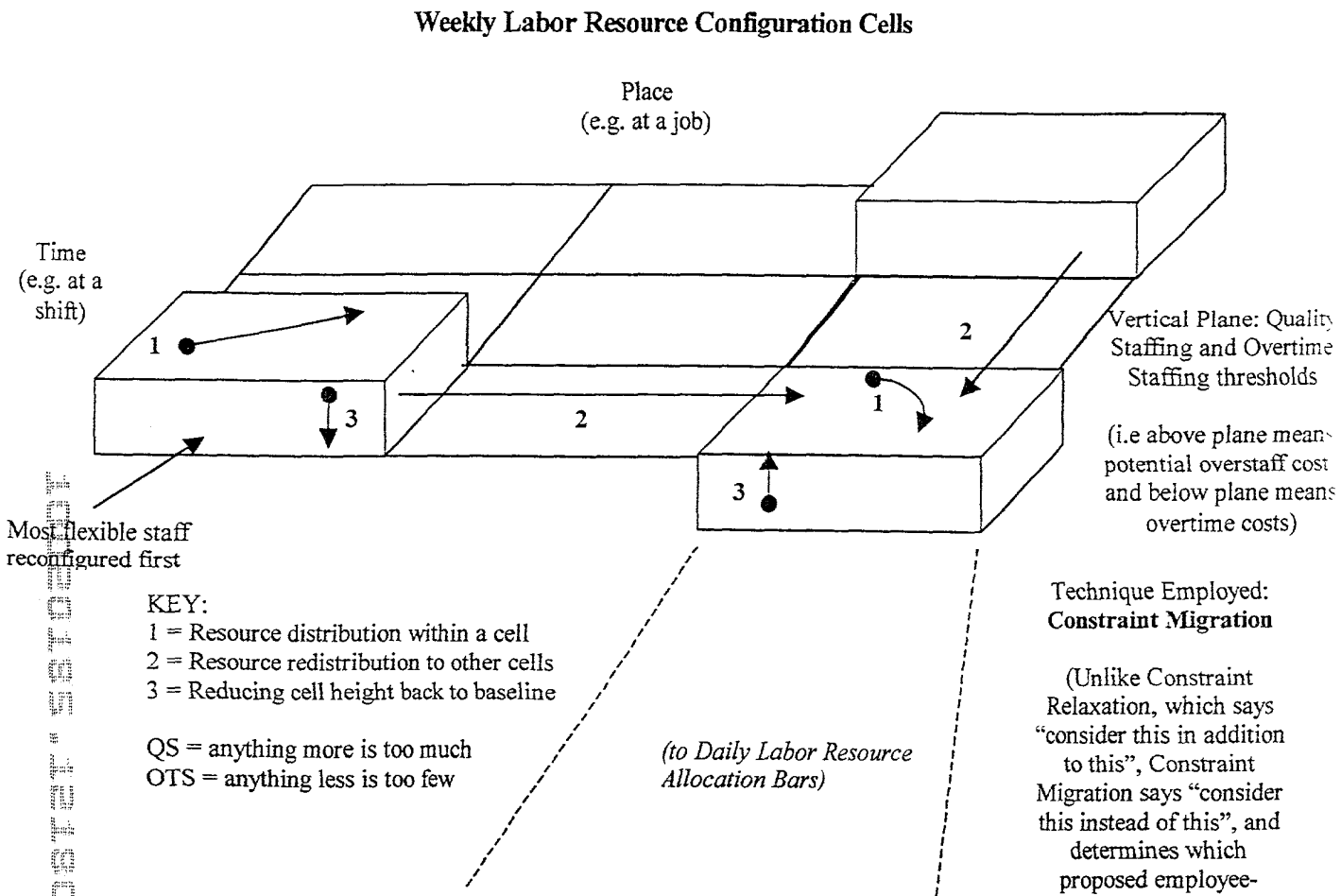


Figure 12 : **Intellicost Transaction Valuation and Selection.**

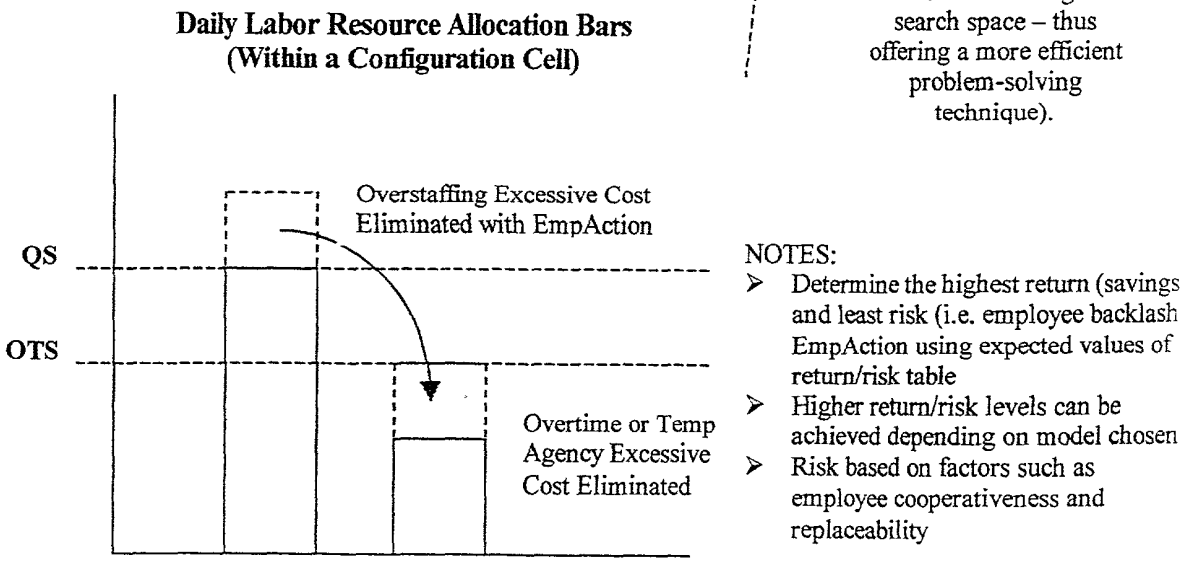


Figure 13: Determining Desired Strike Price Range of Option Order

Facility A	**Facility B**
Policy:	
Call: Purchasing range for nurse staff for call option order $100 - $200	**Call:** $120 - $175
Put: Subsidy range for option order $0 - $50	**Put:** $10 - $60
or	or
Use a % of normal cost range	Use a % of normal cost range
Call: 62% - 120%	75% - 109%
Put: 0% - 30%	6% - 37.5%
or	or
Facility A wants to pay only $0 - $50 for this shift, so facility wants recipient to pay for this shift	Facility B wants to pay $120-$175 for this shift so a subsidy (of normal price) of
$110 - $160	$15 - $40

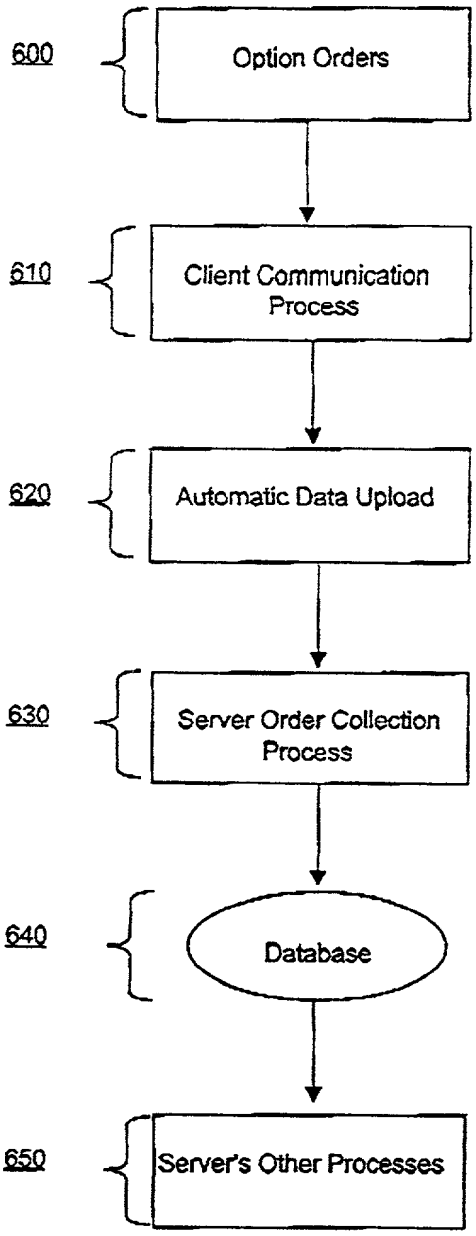


Fig. 14
Delivering Option Order to Exchange Hub

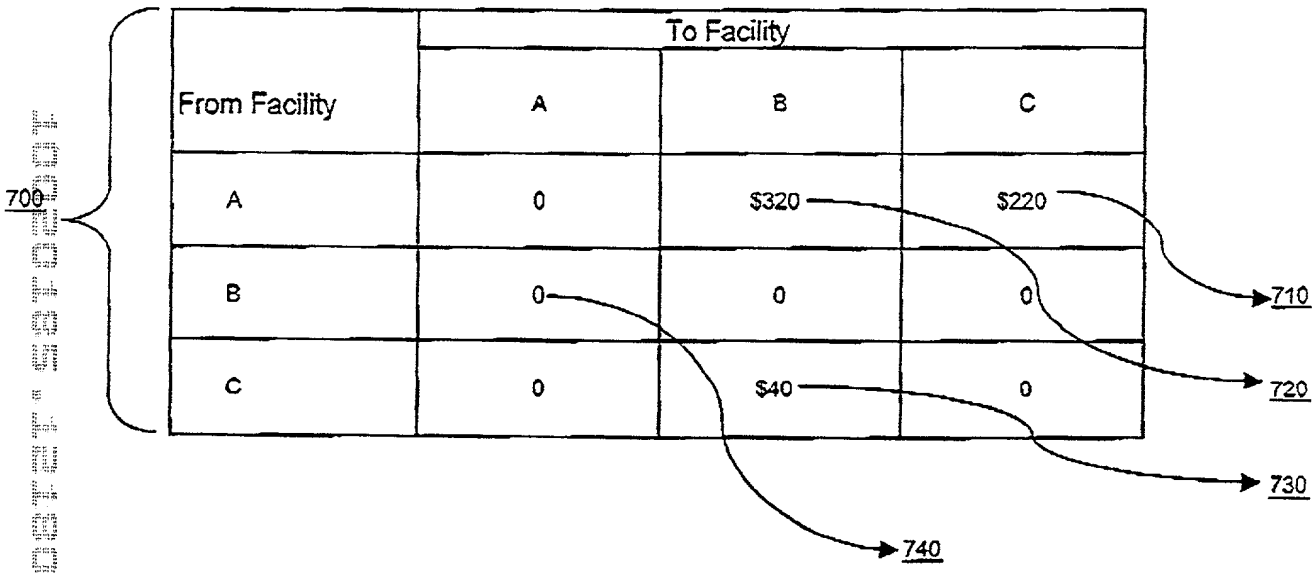


Fig. 15
Option Orders
Matching for Potential
Deals

From Facility	To Facility		
	A	B	C
A	0	$320	$220
B	0	0	0
C	0	$40	0

Facility A: 95 % chance of overstaffing * $160 for OS=$152
$152- 50 subsidy = $102 ROI vs $160

Facility B: 75% chance of agency usage * $160 for OT= $12
$120-$15 subsidy = $105 ROI vs $160

Facility A Expected Value Ranges:

Lower Bound Expected Value:

[Probability of savings * savings from costs avoided or added earnings] - highest deal subsidy cost

Upper Bound Expected Value:

[100% * Highest savings] - lowest subsidy] I.e. return minus investment

repeat for facility B

whichever facility's combined expected value is higher becomes bidder, regardless of whether they will be the donor or recipeint of employee transfer, while lower becomes asker.

Fig. 16
Bidder vs. Asker Determination
in Option Deal Negotiation

Strike Price

(Note: Strike Price is for Asset Price + Fees, & is Payment to Intellicost for Transfer of Underlying Asset)

StrikePrice is what each side pays us for deal to happen...

Scenario 1: NO DEAL

	Fac A	Fac B
LB ROI	145	45
UB ROI	160	155
Tot. ROI	305	200
Donor	Y	
Min. Subsidy	0	
Max. Subsidy	15	
Recipient		Y
Min. Premium		-150
Max. Premium		-40
Bidder	Y	
Asker		Y
Asset Price	160	160
Expect.Return	160	5
	-25	-100

Asker: ROI Range 155 (*UB ROI*) – 45 (*LB ROI*); StrikePrice of Asset 10 – 120 (*Min.Prmt.* – *Max.Prmt.*)

Bidder: *LB ROI* 145 – *UB ROI* 160; 15 – 0 (*Max.Prmt.* – *Min.Prmt.*)

(that is, recipient here wants paid for bulk of shift assignment)

(wants subsidized at least $40, & thus not willing to pay any extra for shift)

(for a $20/hr., 8 hr. long Registered Nurse Shift Assignment)

($5 rtn perhaps due to high risk of census drop, & potential for overstaffing)

Closest Gap: *In StrikePrice* *In ROI* ProposedDealPrice: 135 DealValuation: -25 (ie: DealPrice - AssetPrice)

Fac A will give assg for $15, but Fac B needs $40 payment to make shift = $120 cost

Therefore... NO DEAL (since not all parties can make money on the deal)

Next Scenario...

Scenario 2: DEAL

	Fac A	Fac B
LB ROI	145	5
UB ROI	160	15
Tot. ROI	305	20
Donor	Y	
Min. Subsidy	0	
Max. Subsidy	15	
Recipient		Y
Min. Premium		0
Max. Premium		10
Bidder	Y	
Asker		Y
Asset Price	160	160
Expect.Return	160	15
	25	-140

Asker: ROI Range 15 (*UB ROI*) – 5 (*LB ROI*); StrikePrice of Asset 160 – 170 (*Min.Prmt.* – *Max.Prmt.*)

Bidder: *LB ROI* 145 – *UB ROI* 160; 15 – 0 (*Max.Prmt.* – *Min.Prmt.*)

(willing to pay up to $10 extra for shift, & thus for transfer to come in)

($15 rtn – perhaps a Qual.Cover call, so no significant costs avoided)

Closest Gap: *In StrikePrice* *In ROI* ProposedDealPrice: 185 DealValuation: 25 (ie: DealPrice - AssetPrice)

So to get Fac B the best possible deal within the bidder's acceptance range, we simply have Fac A pay it's highest subsidy...

Therefore... **Strike Price for Fac A = Pay Intellicost $15, which is its max subsidy**

Strike Price for Fac B = Pay Intellicost $160, which is its min premium plus the asset price

Comments:

Here the strike price is determined by taking the asker's lowest subsidy offering as the strike price,
– IF it still falls into a range acceptable for the bidder.
So given that we now want the eventual deal to benefit the asker (Fac B) as much as possible,
we will let Fac A subsidize the deal a little more in this case.

Note that Facility A is becoming the bidder ironically, even though Fac B is the one needing staff, since it would then have the greater incentive to strike the deal due to the higher possible return. Consequently, the negotiation would thus take adifferent path as we would try and see Fac A get the better of strike price.

Note that strike prices will be different depending on whether Intellicost will be taking spreads or not:

Strike Price
If taking spread
Fac B will pay us $10 dollars to get the employee, (as well as $160 to employee)
while Fac A will pay us $15 to offload employee
For a total spread of...
$25 Netted by Intellicost
which means payments from each facility of:
Fac A = $15 Paid to Intellicost
Fac B = $170 Paid to Intellicost and employee

Strike Price
if NOT taking spread

Fig. 17
Determining Final Strike Price
for Option Deal

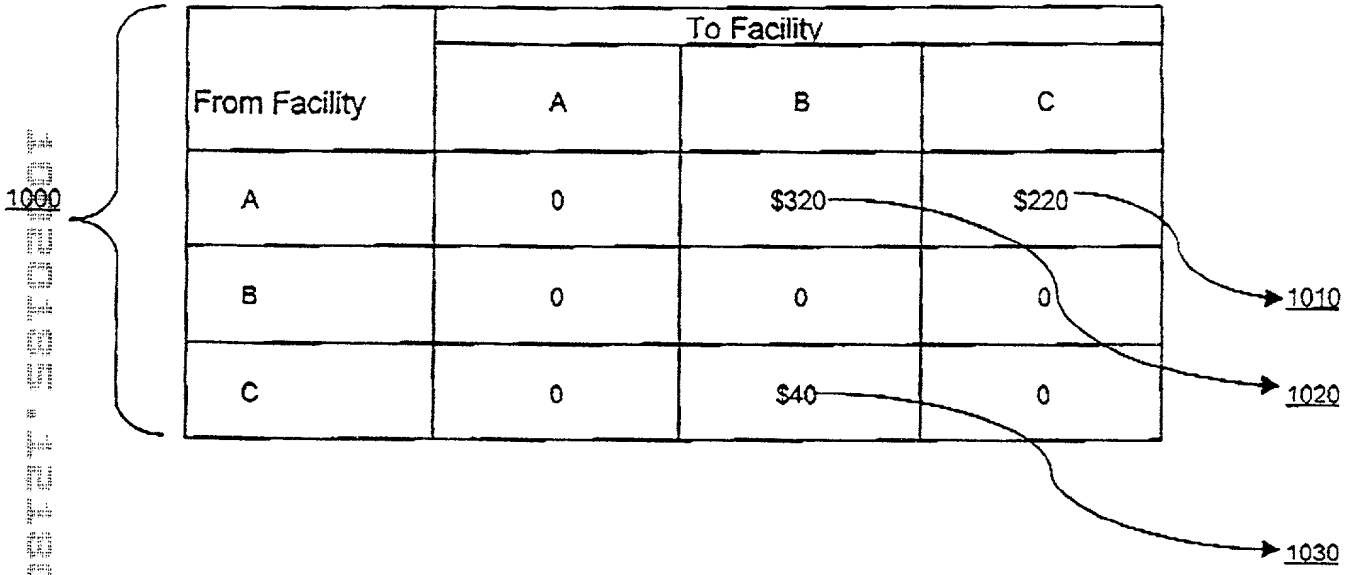
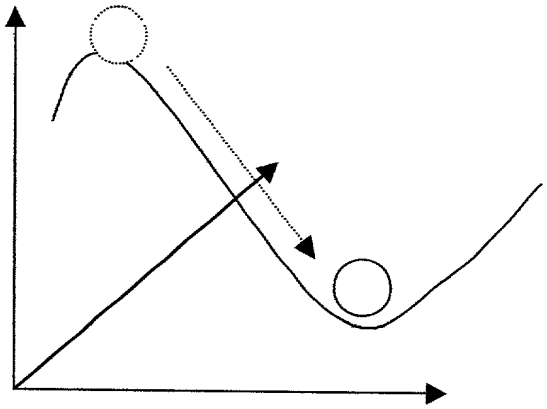


Fig. 18
Determining and Prioritizing which Option Deals to Accept to Members of the EBC, and When to Do So

Figure 19: Optimization via Gradient Descent
(here showing how the technique canvasses a cost terrain)

This optimization technique (also known as "hill climbing") can be used to find an optimal or oftentimes, at least, a near-optimal solution for a variety of transactions, whether it be assignments, employee-actions, or deals.



3-D Cost Terrain Problem-Solving Using Gradient Descent
(here finding a local minimum)

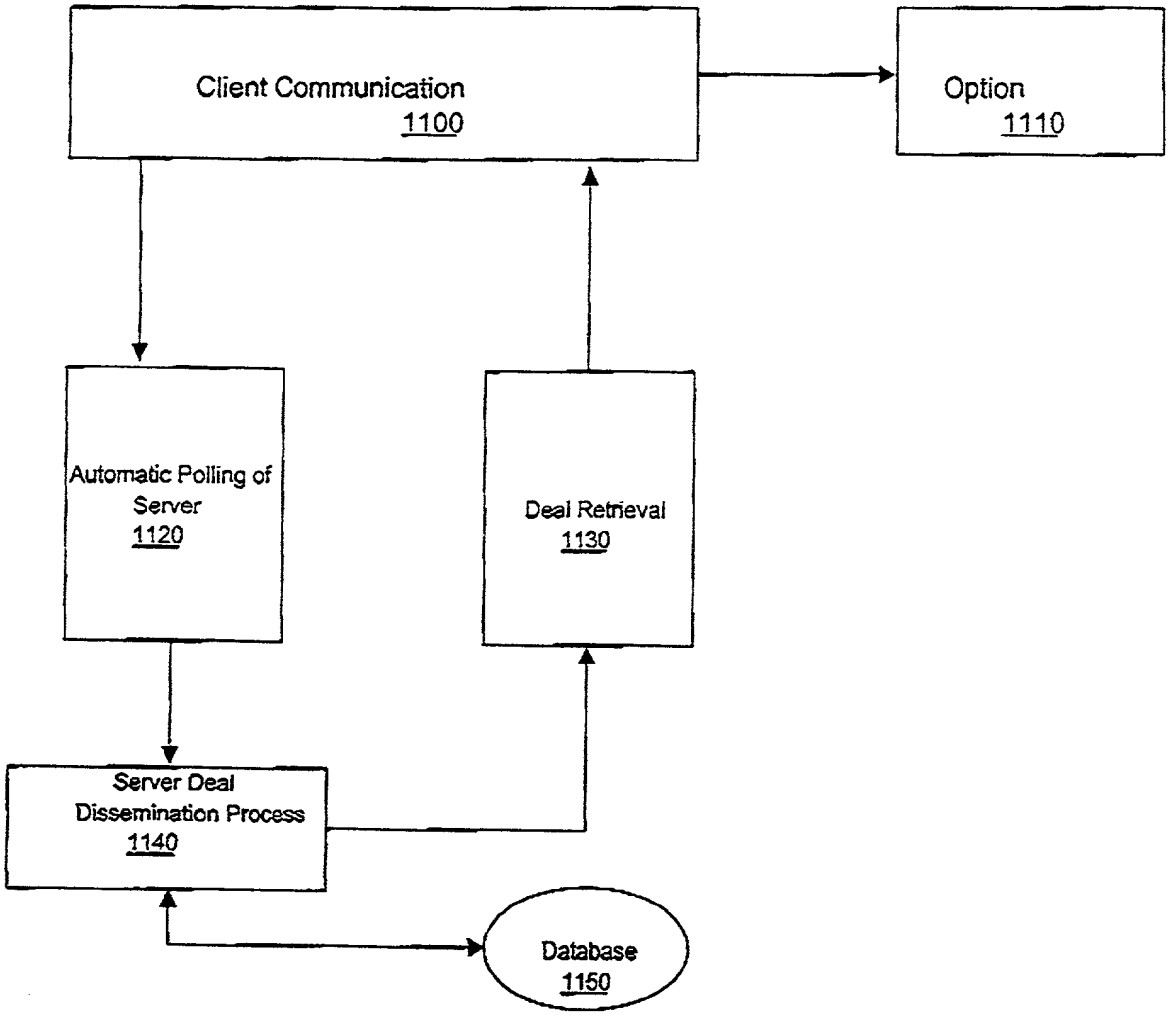


Fig. 20
Delivering Option Tentative Contract from Exchange Hub Back to Clients at Facility

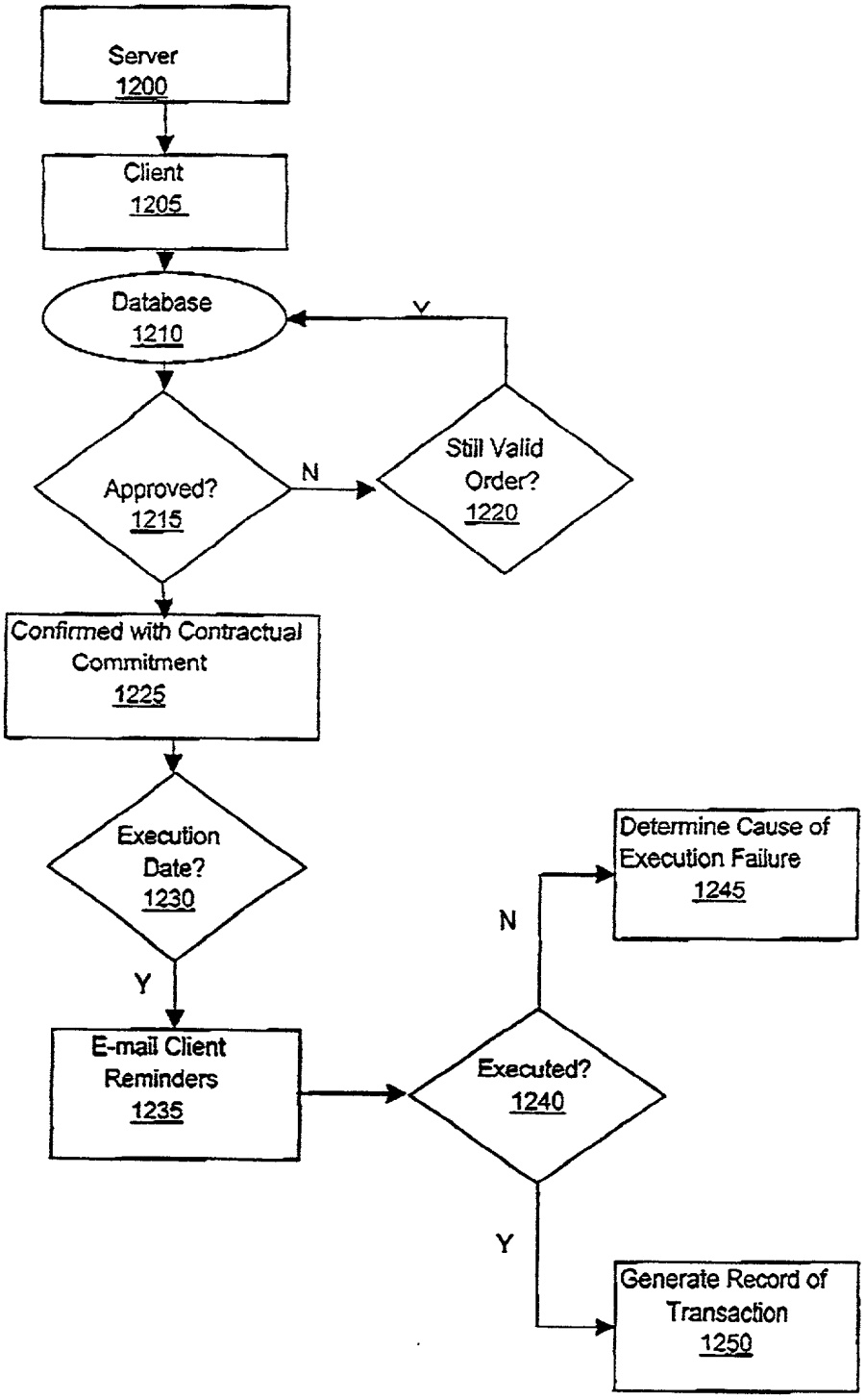


Fig. 21
Tentative Option
Contract Execution

Figure 22

Labor Arbitrage Process as the Facility Sees It

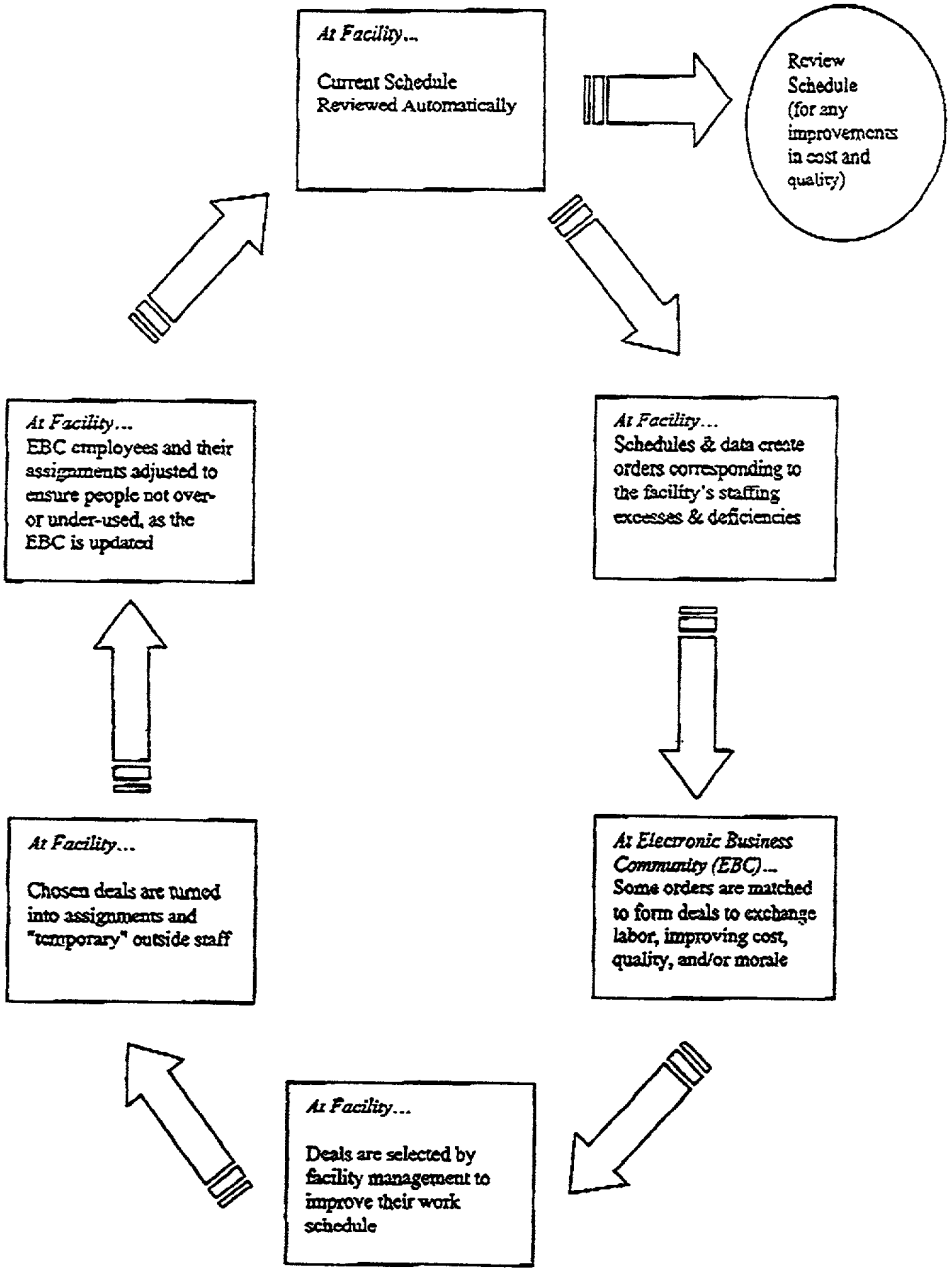


Figure 23
Process Categories Overview

How Client-User interactions fit into process categories already covered, namely Client-Server and Server Arbitrage areas.

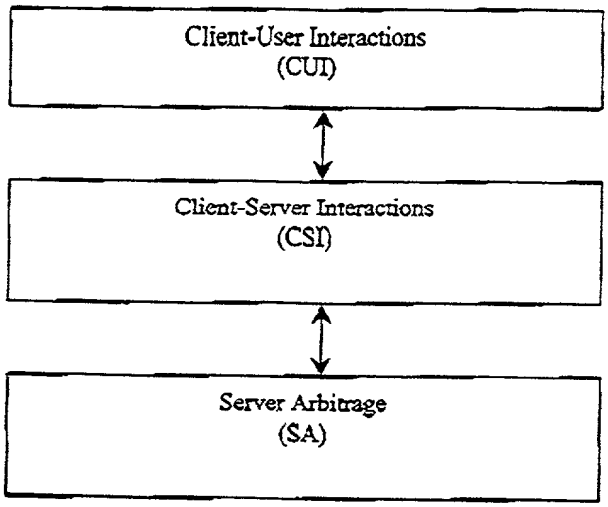
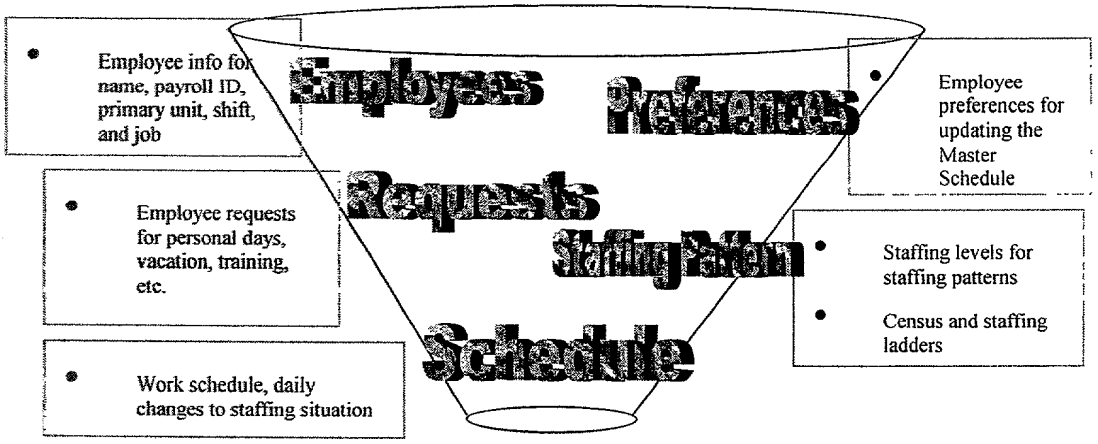


Figure 24

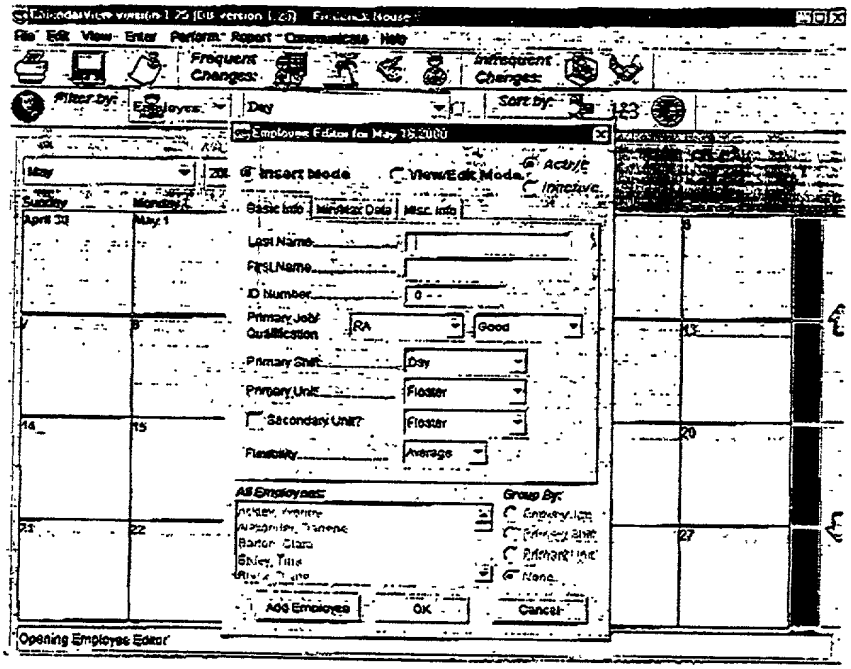
Interfaces used in Client-User Interactions (CUI) Component

"Data Funnel" Overview of General Types of Data required to enable EBC Arbitrage.



- Employees (ES) – this represents the data collected by the Employee Information Editor screen.
- Preferences (PS) – this represents the data collected by the Rotating Schedule and Preferences Editor screen.
- Requests (RS) – this represents the data collected by the Requests Editor screen.
- Staffing Pattern (SS) – this represents the data collected by the Staffing Levels Editor screen.
- Schedule (SC) – this represents the data collected and edited by the CalendarView screen and Assignment Editor screen.

Figure 25
Sample screen to enter and maintain employee information.



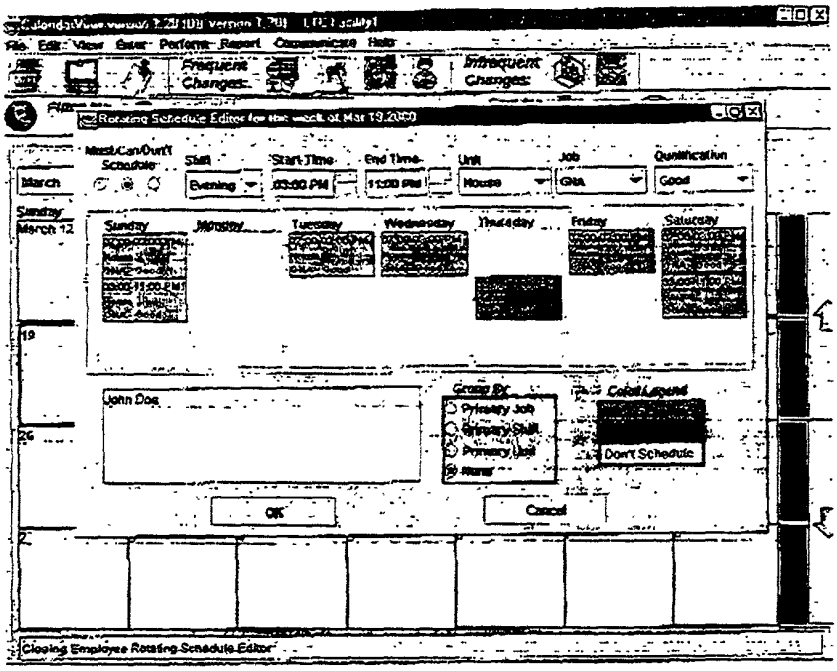
Objective of the Screen:

- To capture the data relating to the labor supply elements, which are the employees that can be utilized to staff a particular staffing need.

Descriptions of Essential Fields Used by Arbitrage Process: (Screen Code CULES.)

1. Last Name and First Name – to indicate easily to the facility which employee is involved.
2. ID-Number – this is a "globally unique" identifier for the employee throughout the entire potential scope of the EBC. Usually involves appending an employee's local payroll number to the globally unique facility ID. However, it could simply be the employee's Social Security Number.
3. Primary Job – this is the primary job that the employee is qualified to work, such as Registered Nurse, Nursing Assistant, etc.
4. Primary Shift – this is preferred shift that the employee expects to work.
5. Primary Unit – this is the floor, wing, or other unit where the employee is asked to focus their time in order to offer the patients more "continuity of care" (i.e. customized attention).
6. Flexibility – this is the simple default flexibility of the employee as initially assessed by the Staffing Coordinator. More complex formulas derive flexibility at later stages.
7. Minimum Shifts Per Week – this is the minimum shifts expected by the employee (usually 5 per week is expected by a Full-Time Employee, or FTE).
8. Minimum Hours Per Week – minimum hours expected by the employee.
9. Maximum Shifts Per Week – maximum expected or allowed for the employee.
10. Maximum Hours Per Week – maximum expected or allowed for the employee.
11. Active Date – this is the first date that an employee can be utilized in staffing.
12. Inactive Date – this is the last day that an employee can be utilized in staffing.

Figure 26
Sample screen to enter and maintain the "Master Schedule" and Availability of each Employee.



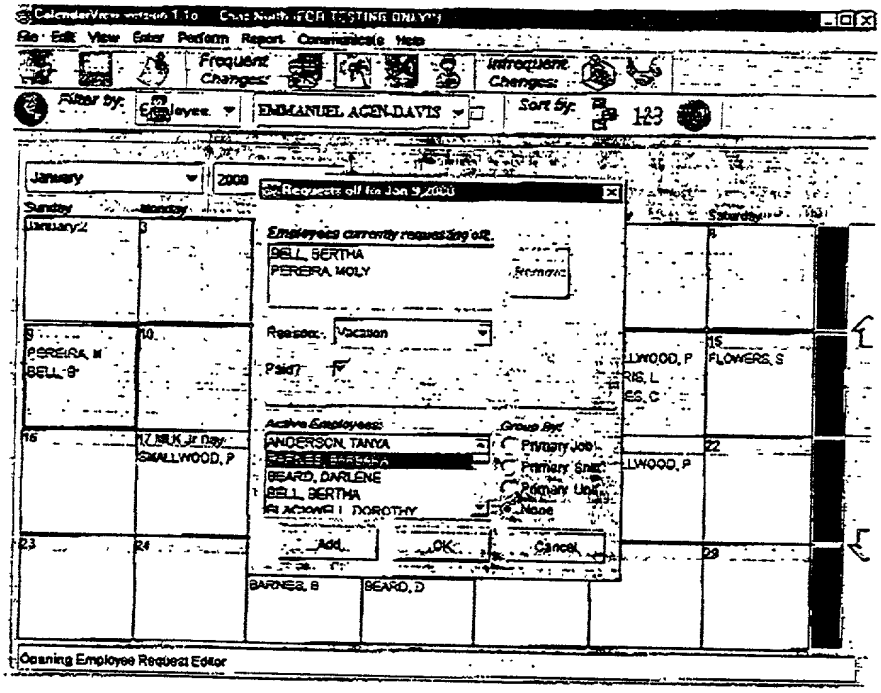
Objective of the Screen:

- To capture the data relating to the employees' normal permanent availability or mandatory scheduling constraints that should be used when evaluating their "fit" for a particular assignment.

Descriptions of Essential Fields Used by Arbitrage Process: (Screen Code CULPS.)

1. Start Date of Preferences' Week – this tells the system to which time-frame these preferences apply to this employee.
2. Name – this is the name of the employee to which the preferences apply.
3. Must Schedule – this indicates that this preference is a mandatory assignment, whether the employee is needed or not.
4. Can Schedule – this indicates that the employee has stated that they are available to work, and thus represents a possible assignment if the employee is needed.
5. Don't Schedule – this is to indicate that the employee has said they cannot work this day, time, shift, etc.
6. Shift – this is to indicate the time-period for the day the employee can work. There are 3 standard shifts usually seen in healthcare: Day (normally 7am-3pm), Evening (normally 3pm-11pm), and Night (normally 11pm-7am).
7. Start-Time – this is used if the time for this preference is not a standard Day/Evening/Night time period mentioned above.
8. End-Time – same as above.
9. Unit – this is if the employee is expected to or expecting to work a different unit from the one they should normally be scheduled at.
10. Job – this is for noting the job qualification of the employee for this particular preference, if different from their primary job type they are expected to work.

Figure 27
Sample screen to enter and maintain employee requests for time-off.



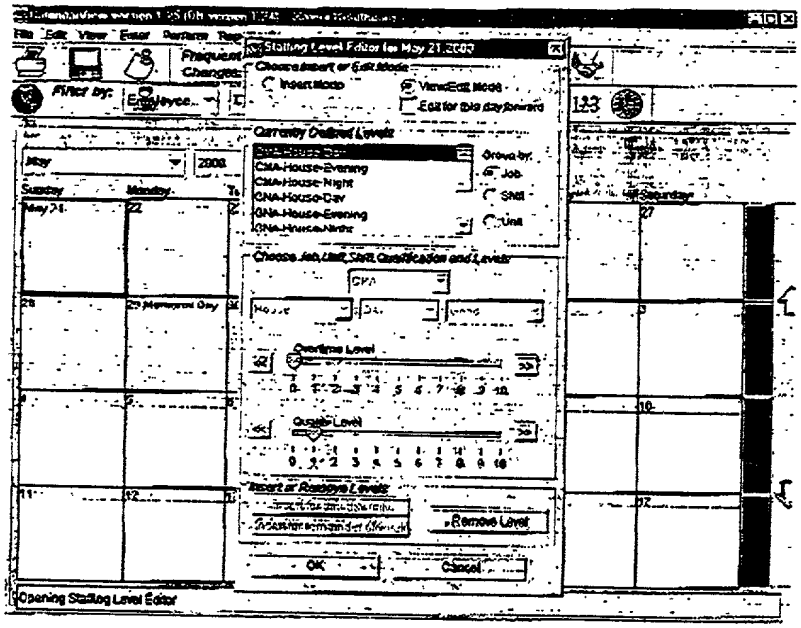
Objective of the Screen:

- To capture the data relating to the employees' temporary availability constraints.

Descriptions of Essential Fields Used by Arbitrage Process: (Screen Code CULRS.)

1. Date – the date of the request for time off.
2. Name – the employee's name that is requesting off.
3. Reason – the reason that the employee has given for their needing to schedule a day off.

Figure 28
Sample screen to enter and maintain staffing levels needed per job, unit, and shift, including the desired quality level as well as absolute minimum level.



Objective of the Screen:

- To capture the data relating to the labor demand elements, which are the slots required to staff a particular staffing need.

Descriptions of Essential Fields Used by Arbitrage Process: (Screen Code CULSS.)

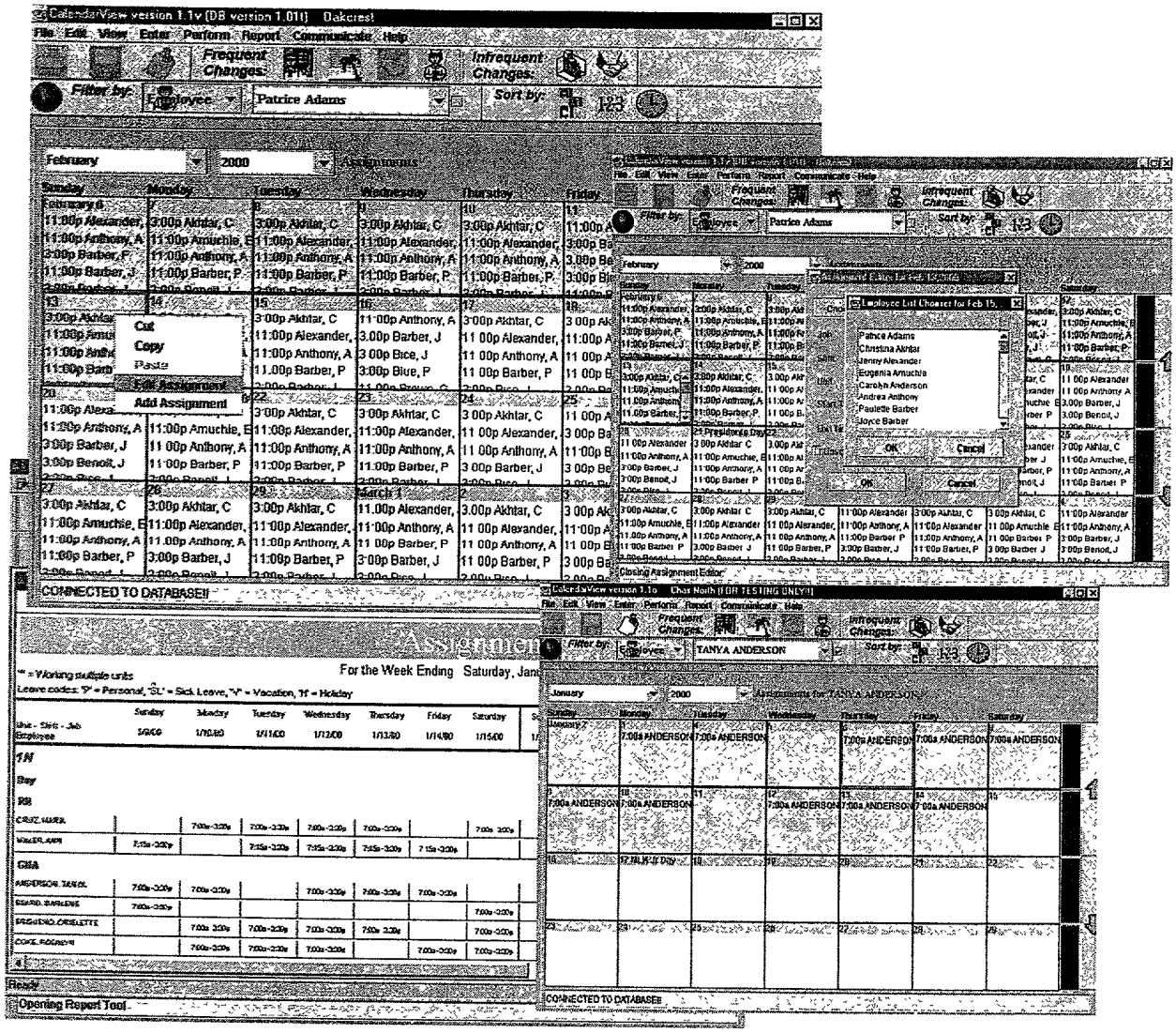
1. Date of Level – this is the date of when a particular need is in effect.
2. Defined Level Name – this defined name is essentially the time-place attributes of the staffing need, such as job-unit-shift-for-this-day.
3. Job – this is the job qualification required for this particular staffing need.
4. Unit – this is the unit to which this particular staffing need applies.
5. Shift – this is the time-period of the day to which this particular staffing need applies.
6. Overtime Level – this is the staffing level that the facility feels is necessary to deliver the absolute minimum level of service and care to their patients/residents. Anything less than this level is considered requiring of staffing by any means possible, including Agency or overtime, and is thus likely going to involve excess cost (i.e. cost is more than the standard shift of an in-house employee).
7. Quality Level Level – this is the staffing level that the facility feels is necessary to deliver quality service and care to their patients/residents. Anything more than this level is considered to be an excess cost from overstaffing.

NOTE:
There is also a standard Facility Data Screen to capture the following types of information, among others:

1. Facility Name, address, & zip code
2. The facility's job types, shift time periods, and unit names
3. The various wage rates for the different jobs, including a entry level wage or average wage rate
4. The various budget data, some through configuration files

Figure 29

Sample screens showing various descriptions of a Work Schedule.



Objectives of the Screen:

- To display the current work schedule that is used to determine the current staffing situation, as well as capture the data relating to the changes in that situation.

Descriptions of Key Components Used by Arbitrage Process: (Screen Code CUI.SC.)

1. Day Cell – shows the day of the work schedule, and holds as its contents the assignments for that day.
2. Date of Cell – shows the date of the cell.
3. Assignment of Employee – the contents of a day cell are known as an assignment – which is a person working at job on a unit on a specific day for a specific shift time period.
4. Assignment Job – this is the job that the employee will hold during this particular assignment.
5. Assignment Shift – this is the shift time period for the assignment.
6. Assignment Unit – this is the job that the employee will hold during this particular assignment.
7. Assignment Start Time – if the shift is not for a standard Day/Evening/Night time-frame, this holds the non-standard starting time.
8. Assignment End Time – if the shift is not for a standard Day/Evening/Night time-frame, this holds the non-standard ending time.

Fig. 30
Intermediate & Text Files Used in Process

Ref.# 5001: One type of Orders file

```
# Type  Facility  Worker  Window  wk/dy/sh/jb/un/qu/$$/nego

### 1 S F R  O  - Fac1:MARIA.DOE 0 0 1 1 0 0 0 MARIA.DOE 2 6 202 Sun
Dec 19 00:00:00 PST 1999 Sun Dec 26 00:00:00 PST 1999 0 0 0 0 0 0 64.0
0.0 64.0
### 2 S F R  O  - Fac1:ERNESTINE.SMITH 0 0 1 2 0 0 0 ERNESTINE.SMITH 3
6 203 Sun Dec 19 00:00:00 PST 1999 Sun Dec 26 00:00:00 PST 1999 0 0 0 0
0 0 64.0 0.0 64.0
```

Ref.# 5002: One type of Deals file

```
# Stat  Parties  Exchange  Fit  Price & Terms  When

### 1 Pending - 1 U 0 U 48 71 168.0 112.0 Fac0:K.DOLL-Fac1 1.0 0.0 - 0
1 0 0 0 Sun Dec 19 00:00:00 PST 1999 Sun Dec 26 00:00:00 PST 1999 0 0 0
1 K.JONES
### 2 Pending - 1 U 0 U 52 73 112.0 168.0 Fac1:KENDRA.SCOTT-Fac0 1.0
0.0 - 2 1 0 0 0 Sun Dec 19 00:00:00 PST 1999 Sun Dec 26 00:00:00 PST
1999 39 239 1 0 KENDRA.BREAU
```